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(54) **Outlet nozzle for pressurized fluid including a flexible membrane sealing the nozzle outlet channel**

Mit einer den Auslasskanal dichtenden, flexiblen Membrane versehene Auslassdüse für unter Druck gesetztes Fluid

Buse de sortie pour fluide pressurisé comprenant une membrane flexible obturant le canal de sortie.

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**FR-A- 2 524 348**

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**EP 0 845 299 B1**

## Description

**[0001]** The present invention refers to the improvements in the outlet nozzles of a pressurized fluid including a flexible membrane sealing the nozzle outlet channel.

**[0002]** More particularly, the present invention refers to improvements in the flexible membranes capable to selectively adjust the hermetic seal in the outlet nozzles of a pressurized fluid, the nozzles of this type being capable to deliver: a spray mist, a sprinkling operation, a gel discreet metering, a distribution of a discreet mass of a cream or pasty liquid, a drop or a gas outlet or a liquid blast, as a function of the nozzle design and of the outcome sought after.

**[0003]** Non-exhaustive and simply illustrative examples of these functions are given in the aerosol containers or packages provided with a pump, capable of causing inside, a positive pressure and to deliver the liquid like a fine sprinkling, such as a perfume, etc.

## FIELD OF THE INVENTION

**[0004]** For the purpose of the present invention, the following elements will be designated and identified with the terms provided hereinafter:

- \*NOZZLE: It identifies the body communicating with the fluid allowing the fluid discharge, such as formerly shown.
- \* OUTLET HEAD: It identifies the element containing or connecting the valve or pumping element, at one end, while at the other end, it contains or is linked to said nozzle; this outlet head can be matched with a valve or pump operating element and can directly be connected to said nozzle or by means of a convenient duct.
- \* CONTENT: The fluid gas-air or powder contained within the package and designed to go out from the nozzle is designated in this way.
- \* PACKAGE: As such is identified every sealed container capable to be housed inside the content and keeping it under the pressure of a subsequent agent, such as a gas or rather submitting it to the action of a pump capable to pressure the content.

## BACKGROUND OF THE INVENTION

**[0005]** The aerosol packages and the packages provided with a pump or a pumping element to distribute its

content are extensively known. These packages deliver its content by means of a pump operation or with a gas keeping the content under a positive pressure.

**[0006]** In anyone of these modes operating at a part of the packages, for instance, at its outlet head, the content is allowed to go out; by defining the content, a content column within the package communicating with the outlet head and hence to the atmosphere.

**[0007]** This is also valid when the content is submitted to an external pressure source.

**[0008]** Usually the content is distributed through an outlet nozzle. Generally the nozzles include small partition walls perpendicular to the direction of the axis of the outgoing fluid flow provided with a small hole; the partition wall inside face mark the boundaries of the front face of a small chamber within which and from a side clearance, the pressurized fluid arrives.

**[0009]** The interconnection between this clearance and said chamber is, at least, achieved with a channel communicating said clearance with said chamber. This channel can be provided with an annular distributor or rather with one or more channels radially or eccentrically relative to the partition wall center being coincident with the outlet hole, so a vortex effect is provided allowing (for instance) the best performance of the sprinkling mist.

**[0010]** Preferably, the partition wall is achieved by means of an inserable part at the nozzle end.

**[0011]** The problem facing the manufacturers and users of these arrangements and packages is to provide an effective sealing for the action of the outside atmosphere as relative to the package's content making up said content column; a seal prevents the air contacting said column.

**[0012]** Really generally, the package sealing is achieved in a separated position as relative to said nozzle outlet hole. This seal, given as an example of a valve sealing, is located generally inwardly from the nozzle, at an intermediate path, between the own container and at times, is also polymerized by the extended air contact.

**[0013]** For instance, when the content is a lacquer, such as a hair fixing lacquer, the lacquer drying (polymerization) is caused within the path, between the nozzle and the valve sealing; an action which puts out the package.

**[0014]** If we are dealing with organic liquids, such as drugs, they can then be converted by oxidation into other compounds, without any therapeutical activity or higher toxicity.

**[0015]** Bearing in mind that according to the package design and the sealing means, in some constructions, this path has a length that can be mostly relevant, this problem as a function of the content features, shows several aspects that have to be overcome.

**[0016]** In the Argentinean patent application 336 078 of the same applicant, a head structure is disclosed, having basically a coupling for a connecting pipe communicating the outlet head with an internal housing,

wherein a coaxial part is located at the housing contiguous to the hole, and defining at least, a side clearance which distributes the liquid and delivers it to a rechamber to which the fluid arrives by means of the already cited channels and when the rechamber is already flown, with or without a rotative motion, the liquid is thrown outside through the nozzle.

**[0017]** In this patent 336 078 its construction required, the interposition of a flexibly resilient membrane located behind the nozzle outlet hole; this membrane being currently in a pressing relation for sealing or plugging against an annular edge, without any interruption; the edge surrounding the outlet hole.

**[0018]** Although compared favourably the outcome provided by this patent application 336 078, which assertions are incorporated herein, it has been found out that not always becomes preferable to manufacture the partition walls with such an edge surrounding the hole. The membrane of this embodiment, according to document 336 078 is preferably flat and shall inwardly be warped. It has been found out that not always the membrane resilient return ensured a hermetic seal as a function of the residual counterpressure in the channels and fluid specific gravity, since this kind of arrangements are also used for thick fluids, such as a cream or a paste.

**[0019]** However, the main problem facing the outcome given to this embodiment, of patent 336 078 is that the same is forcing a further design of the partition wall and of the membrane thrusting insert.

#### OBJECT OF THE INVENTION

**[0020]** It is a main object of the present invention, the improvements in the membrane of the outlet nozzle of a pressurized fluid, and it comprises a flexibly resilient membrane interposed between the outlet partition wall and the remainder of the distributing head by defining a directly sealing relation against the walls of the path of the outlet hole, said package being incorporable to the arrangement of the distributors tip, without forcibly altering its component parts.

#### SUMMARY OF THE INVENTION

**[0021]** In an outlet nozzle of a fluid contained in a package and distributed under a positive pressure, this nozzle has a plate with an outlet hole communicating with an outlet duct, said plate having a collecting channel and eventually forming an outlet vortex of the propelled fluid, the plate being retained by an insert defining laterally, at least, a path for said package content, characterized in that a flexibly resilient membrane is interposed between the internal face of said plate and the face of the opposed insert, said membrane having at the central part of it an active face leaning against the internal face of the central plate, a dome-flared shaped projection defining, at the membrane opposite face, an additional recess; said membrane being pressed against

the plate internal face by said insert, and a hermetic seal is determined at its two respective faces in the areas of the so-squeezed membrane; said dome-flared projection is sealed against the internal walls of the outlet channels defining an annular seal with it, while being selectively movable by the content pressure incident against the membrane active face and said membrane forming against the insert face, an airtight chamber compressible by a warping of said dome-flared projection.

**[0022]** Based upon said combination, many are really the embodiments which can be performed, however with the purpose to define the advantages briefly set out herein; the users may be adding very many other advantages and also to facilitate the understanding of the IMPROVEMENTS IN THE OUTLET NOZZLES OF A PRESSURIZED FLUID INCLUDING A FLEXIBLE MEMBRANE SEALING SAID PRESSURIZED NOZZLE OUTLET CHANNEL, according to the present invention, a preferred example of the embodiment is described below, and illustrated in the attached sheets, with the explanation that this being an example, it is not necessary to designate a limited character of the protection scope of the present patent invention, because simply it has a mere explanatory and illustrative purpose of the basic concept involved, as it is set up therein.

Figure 1 shows a plan view of the internal face of the nozzle outlet plate.

Figure 2 shows the diametral section of the outlet nozzle with the membrane of the present invention and the coupled insert in a resting position and according to the plane AA' of figure 1.

Figure 3 shows a diametral section of the outlet nozzle with the membrane of the present invention and the coupled insert of figure 2 distorted under the pressure of the package content.

Figure 4 shows the membrane isolated section at a wider scale, the half right-hand being related to a variable wall-thickened membrane with a non-plane insert, seen at its half left-hand.

**[0023]** In the figures with the same references are identified the same components and means illustrated therein.

**[0024]** With (1) is identified the outlet plate, being (1a) the outlet hole and (1b) the outlet channel communicating the plate external face with the plate internal face (1c).

**[0025]** This internal face (1c) may have, at least, one of the channels (1a) communicating with the collecting chamber (1g) at its inside end, with the annular distributor (1e) at the other end.

**[0026]** This distributor (1e) communicates with the paths (2a) of the insert (2); the arrows of figure 2 showing the forward direction of the pressurized content.

**[0027]** This arrangement is already known and meets a generical section of a conventional and known outlet nozzle.

[0028] Precisely in the accommodation of the membranes to these known nozzles, is where the present invention novelty lies, because the present invention achieves the same effect that the one obtained with patent 336 078, but without amending the usually applied nozzle structure.

[0029] The present invention is characterized for having a flexible and resilient membrane (3) pressed at its lower face (3a) (see figure 4) by the insert (2), whereas at its upper face (3b) is pressed against the free surfaces or faces (1) (see figure 1) which are limiting the channels (1a).

[0030] The pressure which is pushed against said faces (3a) and (3b) of the membrane (3) is conveniently higher than the fluid pressure raising from the channels (2a-1d) to prevent undesirable leakages.

[0031] The membrane (3) which at its central parts of its upper surface or face (3b) defines its active face and is leaning against the central plate internal face has a dome-flared projection (3c), defining in the membrane opposite face, an additional recess or cavity (3d) facing the free surface (2b) of the insert (2) (see figure 4).

[0032] This dome (3c) seats, at least, with a part of its surface against the outlet channel (1b) with a relation of hermetic seal at its resting position and is originated against the insert face (2b) and the cavity (3d) of the face (3a), while the chamber (3e) is matching with the recess (3d).

[0033] This chamber (3e) is full of air and hermetical at its perimeter by the pressure of the insert wall (2b) against (3a).

[0034] The fluid to be distributed goes forward to the channels (2a), as already said, under pressure from the tank or reservoir, it goes then into the distributor (1g) and penetrates into the channels (1d). There smoothly presses against the dome-flared projection (3c) distorting it towards the insert face (2b), i.e. compressing the air contained in the housing or chamber (3e).

[0035] Because the membrane, for one thing, is by itself flexibly resilient, it does return to its original position when just the fluid positive pressure ceases pushing and for another thing, the membrane returns being aided by the air pressure within this chamber (3e).

[0036] Figure 3 allows to see a possible distribution of said membrane, while figure 4 illustrates a differentiated wall-thickened membrane (3f) with a dome of less decreasing resistance, whereas the left-hand part of the same figure shows a section of the constant membrane (3), however, with a face (2c) of the insert (2) having a depression opposing the cavity (3d).

[0037] The carefully designed combination of the thickness (3f) of the membrane (3) and the shape of the face (2b) of the insert (2) with or without the depression (2c) allowed to determine a pressure threshold of the distortion of the membrane, according to the design requirements.

## Claims

1. OUTLET NOZZLE FOR A PRESSURIZED FLUID, this nozzle being applied to the outlet of a package containing the fluid to be distributed under a positive pressure; the nozzle having a plate (1) with an outlet hole (1a) communicating with an outlet duct (1b), said plate having collecting channels (1d) and eventually forming the outlet vortex of the propelled fluid; the plate (1) being retained by an insert (2) laterally defining, at least, a path (2a) for said package content, **characterized in that** a generally resilient membrane (3) is interposed between the internal face (1c) of said plate and the face (2a) of the insert facing it; said membrane having, at the central part of it an active face leaning against the plate internal face with said outlet hole, a dome-flared projection (3c) defining a recess at the membrane face opposite said active face; said membrane being pressed against the plate internal face (1c), and respectively against the free face (2a) of said insert by the body (2) of said insert and determining at the areas of this so squeezed membrane, a hermetic seal, at its respective two opposite faces; said dome-flared projection (3c) being seated against the internal wall of the outlet channel (1b) provided on said plate, and defining an annular sealing with it, and being selectively movable by the content pressure incident against the membrane active face, and said membrane forming against the insert face (2b), an air-sealed chamber (3e) being compressible by the distortion of said flared projection.
2. OUTLET NOZZLE according to claim 1, **characterized in that** said membrane has a constant cross-section.
3. OUTLET NOZZLE according to claim 1, **characterized in that** said membrane has a variable cross-section thinner at the dome-flared end.
4. OUTLET NOZZLE according to claim 1, **characterized in that** said insert has a flat surface against the membrane opposite face pressing thereon.
5. OUTLET NOZZLE according to claim 1, **characterized in that** said insert has a surface provided with a recess (2c) defining an opposite cavity and opposed to the membrane recess against the membrane opposite face pressing thereon.

## Patentansprüche

1. Austrittsdüsen für unter Druck stehende Flüssigkeiten, wobei die Düsen am Austritt eines die zu verteilende Flüssigkeit mit positivem Druck enthaltenden Behälters angebracht sind, mit einer Platte (1),

die eine mit dem Austrittskanal (1b) kommunizierende Austrittsöffnung (1a) und Sammelkanäle (1d) aufweist, gegebenenfalls den Austrittswirbel der Spritzflüssigkeit bildet und von einem seitlich wenigstens eine Bahn (2a) für den Behälterinhalt vor-  
 5  
 sehenden Einsatzstück (2) festgehalten wird, **dadurch gekennzeichnet, dass** zwischen der Innenseite (1c) dieser Platte und der dieser Platte zugewandten Seite (2a) des Einsatzstückes eine generell elastische Membran (3) angeordnet ist, dass  
 10  
 diese Membran in ihrem Mittelteil eine an der Innenseite der mit der Austrittsöffnung versehenen Platte anliegende, aktive Fläche und eine kuppelförmige Ausbuchtung (3c), welche auf der der aktiven Fläche gegenüberliegenden Membranseite (Unterseite)  
 15  
 eine Mulde bildet, aufweist, wobei diese Membran vom Körper (2) des Einsatzstückes gegen die Innenseite (1c) der Platte und dementsprechend gegen die freie Seite (2a) des Einsatzstückes gedrückt wird und somit in den Bereichen, in denen  
 20  
 die Membran zusammengedrückt wird, jeweils auf beiden Seiten der Membran ein hermetischer Verschluss gebildet wird und dass die kuppelförmige Ausbuchtung (3c) an der Innenwand des in der Platte vorgesehenen Austrittskanals (1b) aufliegt, mit  
 25  
 dieser Platte einen ringförmigen Verschluss bildet und durch den auf die aktive Fläche der Membran wirkenden Druck des Behälterinhalts selektiv verschiebbar ist, und die Membran mit der Seite (2b) des Einsatzes eine luftdichte Kammer (3e) bildet, welche durch Verformung der kuppelförmigen Ausbuchtung zusammen-drückbar ist.

2. Austrittsdüse nach Anspruch 1, **dadurch gekennzeichnet, dass** die Membran einen konstanten  
 35  
 Querschnitt hat.
3. Austrittsdüse nach Anspruch 1, **dadurch gekennzeichnet, dass** die Membran einen veränderlichen Querschnitt hat, der in der kuppelförmigen Aus-  
 40  
 buchtung dünner ist.
4. Austrittsdüse nach Anspruch 1, **dadurch gekennzeichnet, dass** der Einsatz auf der der Membran zugewandten Seite eine flache Oberfläche auf-  
 45  
 weist, welche auf die Membranunterseite drückt.
5. Austrittsdüse nach Anspruch 1, **dadurch gekennzeichnet, dass** die auf die Membranunterseite drückende Oberfläche des Einsatzstückes einen  
 50  
 Vertiefung (2c) aufweist, welche eine Ausnehmung bildet und gegenüber der von der Membranunterseite gebildeten Mulde angeordnet ist.

## Revendications

1. Tuyères de sortie pour fluides sous pression, dont

les tuyères sont appliquées à la sortie d'un récipient qui contient le fluide à distribuer à une pression positive; la tuyère possédant une plaque (1) pourvue d'un orifice de sortie (1a) qui communique avec la conduite de sortie (1b), ladite plaque possédant des canaux de collecte (1d) et formant éventuellement le tourbillon de sortie du fluide projeté; la plaque (1) étant retenue par une pièce d'insertion ou insertion  
 (2) qui définit latéralement, au minimum, un par-  
 5  
 cours (2a) pour le contenu dudit récipient, **caracté-  
 risée en ce qu'une** membrane (3) présentant des caractéristiques générales élastiques est interposée entre la face interne (1c) de ladite plaque et la face (2a) de l'élément d'insertion ou insertion orien-  
 10  
 tée vers celle-ci; ladite membrane possédant, au centre, une face active qui établit le contact avec la face interne de la plaque comportant ledit orifice de sortie, un ressaut (3c) en forme de dôme qui définit un recoupement sur la face de la membrane oppo-  
 15  
 sée à ladite face active; ladite membrane étant pressée contre la face (1c) interne de la plaque et, de façon correspondante, contre la face libre (2a) de ladite insertion ou pièce d'insertion par le corps (2) de ladite insertion et déterminant sur cette mem-  
 20  
 brane ainsi aplatie une fermeture étanche et her-  
 métique sur les deux faces respectives opposées; ledit ressaut en forme de dôme (3c) étant assis sur la paroi interne du canal de sortie (1b) disposé dans  
 25  
 ladite plaque et définissant avec celle-ci une ferme-  
 ture annulaire et étant déplaçable sélectivement par la pression du contenu ayant une incidence sur la face active de la membrane; ladite membrane for-  
 30  
 mant contre la face (2b) de l'insertion une chambre (3e) étanche à l'air qui est compressible par la dis-  
 torsion dudit ressaut en forme de dôme.

2. Tuyère de sortie, suivant la revendication 1, **carac-  
 35  
 térisée en ce que** ladite membrane a une section transversale constante.
3. Tuyère de sortie, suivant la revendication 1, **carac-  
 40  
 térisée en ce que** ladite membrane a une section transversale plus mince variable à l'extrémité en forme de dôme.
4. Tuyère de sortie, suivant la revendication 1, **carac-  
 45  
 térisée en ce que** ladite insertion a une surface plate contre la face opposée de la membrane qui exerce une pression sur celle-ci.
5. Tuyère de sortie, suivant la revendication 1, **carac-  
 50  
 térisée en ce que** ladite pièce d'insertion a une surface munie d'un recoupement (2c) qui définit une cavité opposée et qui est opposée au recoupement de la membrane contre la face opposée de la mem-  
 55  
 brane qui fait pression sur celle-ci.



